

CECW-ED

**DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
Washington, DC 20314-1000**

EM 1110-2-2901

Manual
No. 1110-2-2901

30 May 1997

**Engineering and Design
TUNNELS AND SHAFTS IN ROCK**

1. Purpose. This manual was prepared by CECW-ED and CECW-EG and provides technical criteria and guidance for the planning, design, and construction of tunnels and shafts in rock for civil works projects. Specific areas covered include geological and geotechnical explorations required, construction of tunnels and shafts, design considerations, geomechanical analysis, design of linings, and instrumentation and monitoring.

2. Applicability. This manual applies to all Headquarters, U.S. Army Corps of Engineers (HQUSACE) elements, major subordinate commands, districts, laboratories, and field-operating activities having responsibilities for the design of civil works projects.

FOR THE COMMANDER:



OTIS WILLIAMS
Colonel, Corps of Engineers
Chief of Staff